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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/775,849	02/09/2004	Haixin Yang	EL0543USNA	1160

23906 7590 03/07/2008

E I DU PONT DE NEMOURS AND COMPANY
LEGAL PATENT RECORDS CENTER
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EXAMINER	
MAYES, MELVIN C	

ART UNIT	PAPER NUMBER
1791	

NOTIFICATION DATE	DELIVERY MODE
03/07/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTO-Legal.PRC@usa.dupont.com

Office Action Summary	Application No.	Applicant(s)	
	10/775,849	YANG, HAIXIN	
	Examiner	Art Unit	
	Melvin C. Mayes	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 February 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

(1)

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 5, 2008 has been entered.

Double Patenting

(2)

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

(3)

Claims 40 and 41 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3 and 4 of copending Application No. 10/775,848 in view of Kodas et al. 2003/0148024.

Copending Application No. 10/775,848 claims a method for the deposition of an ink jet printable composition to a substrate comprising:

depositing an ink composition on a substrate by ink jet printing; wherein said composition comprises:

(a) conductive functional material;

(b) organic polymer comprising polyvinylpyrrolidone; dispersed in

(c) dispersion vehicle selected from organic solvent, water, or mixtures thereof;

and wherein the viscosity of said composition is between 5 mPa.s to 50 mPa.s at a temperature of 25 to 35°C wherein the conductive functional material has an average particle size (D_{50}) of 0.1 to 1.2 microns, wherein the D_{100} is not larger than 5 microns; and wherein said composition maintains stability for 24 hours;

(d) firing said ink jet printable composition and substrate

wherein said composition further comprises a monomer, wherein said monomer is ultraviolet curable or thermally curable,

wherein said substrate is treated to change its surface tension or

wherein said substrate is selected from the group consisting of glass, ceramic and plastic.

Copending Application No. 10/775,848 does not claim that the ink composition is ink jet printed to form at least one patterned layer and that the conductive functional material is spherical.

Kodas et al. teach that conductive electronic features are made on substrates such as glass, ceramic and polymeric substrates by an ink jet printable composition comprising metal particles, the particles being spherical so as to disperse more readily in a liquid suspension and impart advantageous flow characteristics for ink jet deposition [0067].

It would have been obvious to one of ordinary skill in the art to have modified the method of copending Application No. 10/775,848 for the deposition of an ink jet printable composition to a substrate by using the method to deposit conductive electronic features on the substrate, as taught by Kodas et al., as the use of such as ink jet composition for printing patterned layers on substrates such as glass. Providing the conductive functional material as spherical particles would have been obvious to one of ordinary skill in the art, as taught by Kodas et al., so as to disperse the particles more readily in the liquid suspension and impart advantageous flow characteristics for ink jet deposition.

This is a provisional obviousness-type double patenting rejection.

(4)

Claims 1, 3, 4, 7, 9, 10, 13-15, 20-22, 25, 26, 28, 29 and 32-34 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3 and 4 of copending Application No. 10/775,848 in view of Kodas et al. 2003/0148024 and either Grundy 4,859,241 or Kydd 6,036,889.

Copending Application No. 10/775,848 claims a method for the deposition of an ink jet printable composition to a substrate comprising:

depositing an ink composition on a substrate by ink jet printing; wherein said composition comprises:

(a) conductive functional material;

(b) organic polymer comprising polyvinylpyrrolidone; dispersed in

(c) dispersion vehicle selected from organic solvent, water, or mixtures thereof;

and wherein the viscosity of said composition is between 5 mPa.s to 50 mPa.s at a temperature of 25 to 35°C wherein the conductive functional material has an average particle size (D_{50}) of 0.1 to 1.2 microns, wherein the D_{100} is not larger than 5 microns; and wherein said composition maintains stability for 24 hours;

(d) firing said ink jet printable composition and substrate

wherein said composition further comprises a monomer, wherein said monomer is ultraviolet curable or thermally curable,

wherein said substrate is treated to change its surface tension or

wherein said substrate is selected from the group consisting of glass, ceramic and plastic.

Copending Application No. 10/775,848 does not claim that the ink composition is ink jet printed to form at least one patterned layer and that the conductive functional material is spherical.

Kodas et al. teach that conductive electronic features are made on substrates such as glass, ceramic and polymeric substrates by an ink jet printable composition comprising metal

particles, the particles being spherical so as to disperse more readily in a liquid suspension and impart advantageous flow characteristics for ink jet deposition [0067].

Grundy teaches that silver powder-filled paste is provided with stable viscosity over a wide range of storage and application temperatures which insures consistent paste performance by coating the silver powder with a surfactant such as silver stearate (col. 1, lines 32-56).

Kydd teaches that metal powder in a composition for providing conductors on a substrate by printing is stabilized by coating the metal powder with a surfactant such as stearic acid to prevent premature agglomeration of the metal particles (col. 8, line 66 – col. 9, line 2).

It would have been obvious to one of ordinary skill in the art to have modified the method of copending Application No. 10/775,848 for the deposition of an ink jet printable composition to a substrate by using the method to deposit conductive electronic features on the substrate, as taught by Kodas et al., as the use of such as ink jet composition for printing patterned layers on substrates such as glass. Providing the conductive functional material as spherical particles would have been obvious to one of ordinary skill in the art, as taught by Kodas et al., so as to disperse the particles more readily in the liquid suspension and impart advantageous flow characteristics for ink jet deposition.

It would have been obvious to one of ordinary skill in the art to have further modified the method of copending Application No. 10/775,848 by providing the spherical particles as coated with a fatty acid, as taught by Grundy, to provide the composition with stable viscosity over a wide range of storage and application temperatures which insures consistent composition performance, or as taught by Kydd, to prevent premature agglomeration of the particles.

This is a provisional obviousness-type double patenting rejection.

Claim Rejections - 35 USC § 102

(5)

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(6)

Claim 40 is rejected under 35 U.S.C. 102(b) as being anticipated by DE 19846096.

DE 19846096 discloses a method of making structured, electrically conductive areas on substrates comprising:

applying a composition by ink jet printing to a substrate such as a glass substrate to form structured areas and conductive strips, the ink jet printable composition comprising:

(1) spherical, conductive ternary oxide particles (a functional material of a compound having electrical properties and uncoated),

(2) at least one dispersing agent such as polyvinyl pyrrolidone; dispersed in

(3) solvent such as water, organic solvent or mixture thereof; and wherein the viscosity of the composition is less than 20 mPa.s, preferably 0.5-10 mPa.s (thus overlapping the claimed range of 5-50 mPa.s), and

heating the substrate and composition to 400°C (firing) (computer translation, pgs. 2-17).

Claim Rejections - 35 USC § 103

(7)

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(8)

Claims 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kodas et al. 2003/0148024 in view of Bishop 5,744,245.

Kodas et al. disclose a method of making conductive electronic features comprising:

applying a composition by ink jet printing to a substrate such as a glass substrate, ceramic substrate or polymeric substrate, the substrate treated by various methods including surface energy patterning the surface of the substrate or modifying the surface tension of the substrate with a surfactant, the ink jet printable composition comprising:

(1) molecular metal precursors and spherical micron-sized metal particles (a functional material of an element having electrical properties and uncoated),

(2) one or more polymers; dispersed in

(3) solvent by itself or with water,

wherein the viscosity of the composition is preferably not greater than 50 cP for ink jet printing (50 mPa.s) such as in the range of 10-40 cP (10-40 mPa.s); and

heating to form the conductive feature, the heating including sintering the particles or the precursor [0018]-[0280]. Kodas et al. disclose that the one or more polymers can be thermoplastic or thermoset polymers but do not specifically disclose that the one or more polymers in the composition includes polyvinyl pyrrolidone.

Bishop teaches that in an ink jet printable composition for forming electrically conductive pathways on insulating materials such as ceramic or glass substrates and comprising a metal precursor and additive such as metal powder, the polymeric resin in the composition preferable formed a solution, dispersion or emulsion in the water/co-solvent mixture and suitable resin are known materials, preferably one or more of polyvinyl pyrrolidone resins, polymethacrylic resin and polycellulose ether resins (col. 7, lines 42-67).

It would have been obvious to one of ordinary skill in the art to have modified the method of Kodas et al. for making conductive electronic features on a glass substrate by providing the polymer in the composition as polyvinyl pyrrolidone, as taught by Bishop, as one of the preferable polymeric resins used in an ink jet printable composition for forming electrically conductive features on substrates such as of glass. The use of polyvinyl pyrrolidone as the polymer forming a solution, dispersion or emulsion in the solvent would have been obvious to one of ordinary skill in the art because Kodas et al. do not limit the polymer that can be provided in the composition and Kodas et al. teach that polyvinyl pyrrolidone is one of the preferred polymers used in such composition, thus suggesting to provide polyvinyl pyrrolidone as an organic polymer for dispersing the spherical metal particles (functional material), as claimed.

(9)

Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over DE 19846096 in view of Kodas et al. 2003/0148024.

DE 19846096 discloses a method of making structured, electrically conductive areas on substrates comprising:

applying a composition by ink jet printing to a substrate such as a glass substrate to form structured areas and conductive strips, the ink jet printable composition comprising:

(1) spherical ternary oxide particles (a functional material of a compound having electrical properties and uncoated),

(2) at least one dispersing agent such as polyvinyl pyrrolidone; dispersed in

(3) solvent such as water, organic solvent or mixture thereof; and wherein the viscosity of the composition is less than 20 mPa.s, preferably 0.5-10 mPa.s (thus overlapping the claimed range of 5-50 mPa.s, and

sintering at 400°C (computer translation, pgs. 2-17).

DE '096 does not disclose treating the surface of the substrate.

Kodas et al. teach that in applying conductive electronic features to a substrate by ink jet printing a composition, to prevent the composition from wetting the surface of the substrate and rapidly spreading, thus negating the advantages of fine line printing, the substrate can be treated by various methods including surface energy patterning the surface of the substrate or modifying the surface tension of the substrate with a surfactant [0158]-[0170], [0191].

It would have been obvious to one of ordinary skill in the art to have modified the method of DE '096 for making structured, electrically conductive areas on a substrate by

providing the surface of the substrate as treated by surface energy patterning or modifying of its surface tension with a surfactant, as taught by Kodas et al., to prevent the composition from wetting the surface of the substrate and rapidly spreading, thus negating the advantages of fine line printing by the composition.

(10)

Claims 1 and 3-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kodas et al. 2003/0148024 in view of Bishop 5,744,245 and either Grundy 4,859,241 or Kydd 6,036,889.

Kodas et al. disclose a method of making conductive electronic features comprising:

applying a composition by ink jet printing to a substrate such as a glass substrate, the substrate treated by various methods including surface energy patterning the surface of the substrate or modifying the surface tension of the substrate with a surfactant, the ink jet printable composition comprising:

(1) molecular metal precursors and spherical micron-sized metal particles (a functional material of an element having electrical properties and uncoated),

(2) one or more polymers; dispersed in

(3) solvent by itself or with water,

wherein the viscosity of the composition is preferably not greater than 50 cP for ink jet printing (50 mPa.s) such as in the range of 10-40 cP (10-40 mPa.s); and

heating to form the conductive feature, the heating including sintering the particles or the precursor [0018]-[0280].

Kodas et al. disclose that the one or more polymers can be thermoplastic or thermoset polymers [0124] but do not specifically disclose that the one or more polymers in the composition includes polyvinyl pyrrolidone. Kodas et al. disclose that surfactants can be used to maintain the particles in suspension [0225] but do not disclose providing the spherical micron-sized metal particles as coated with a fatty acid.

Bishop teaches that in an ink jet printable composition for forming electrically conductive pathways on insulating materials such as ceramic or glass substrates and comprising a metal precursor and additive such as metal powder, the polymeric resin in the composition preferable formed a solution, dispersion or emulsion in the water/co-solvent mixture and suitable resin are known materials, preferably one or more of polyvinyl pyrrolidone resins, polymethacrylic resin and polycellulose ether resins. The amount of resin in the composition is usually 5-45% (col. 7, lines 42-67, col. 8, lines 21-23).

Grundy teaches that silver powder-filled paste is provided with stable viscosity over a wide range of storage and application temperatures which insures consistent paste performance by coating the silver powder with a surfactant such as silver stearate (col. 1, lines 32-56).

Kydd teaches that metal powder in a composition for providing conductors on a substrate by printing is stabilized by coating the metal powder with a surfactant such as stearic acid to prevent premature agglomeration of the metal particles (col. 8, line 66 – col. 9, line 2).

It would have been obvious to one of ordinary skill in the art to have modified the method of Kodas et al. for making conductive electronic features on a glass substrate by providing the polymer in the composition as polyvinyl pyrrolidone, as taught by Bishop, as one of the preferable polymeric resins used in an ink jet printable composition for forming

electrically conductive features on substrates such as of glass. The use of polyvinyl pyrrolidone as the polymer forming a solution, dispersion or emulsion in the solvent would have been obvious to one of ordinary skill in the art because Kodas et al. do not limit the polymer that can be provided in the composition and Kodas et al. teach that polyvinyl pyrrolidone is one of the preferred polymers used in such composition, thus suggesting to provide polyvinyl pyrrolidone as an organic polymer for dispersing the spherical metal particles (functional material), as claimed.

It would have been obvious to one of ordinary skill in the art to have further modified the method of Kodas et al. by providing the spherical metal particles as coated with a fatty acid, as taught by Grundy, to provide the composition with stable viscosity over a wide range of storage and application temperatures which insures consistent composition performance, or as taught by Kydd, to prevent premature agglomeration of the particles. Coating the particles with either silver stearate (a salt of stearate) or stearic acid, each a fatty acid, would have been obvious to one of ordinary skill in the art, to provide the composition with stable viscosity during storage, as taught by Grundy, or to stabilize the metal particles by preventing agglomeration, as taught by Kydd. By providing the particles as coated with fatty acid to stabilize the particles, the composition provided obviously has a stability of up to 24 hours, as claimed in Claims 4 and 22.

Regarding Claims 3 and 21, the viscosity for ink jet printing is in the range of 10-40 cP (10-40 mPa.s) [0220].

Regarding Claims 5, 6, 16, 23, 24 and 35, the molecular metal precursors can be silver, copper, silver and palladium, platinum, gold or nickel and the micron-sized particles can be

silver, palladium, copper, gold, platinum and nickel or insulating phase such as titania [0031], [0257]-[0263].

Regarding Claims 7, 9, 25 and 28, surfactants can be used to modify the substrate to achieve the values of surface tensions and interfacial energies required [0191].

Regarding Claims 8 and 27, the surface tension of the composition is chosen to be 5,10, 15, 20 or 25 dynes/cm greater than that of the substrate, ink jet heads require surface tensions of 20-50 dynes/cm depending on the type of ink jet head, most electrical substrates have surface tension values in the range of 18 to 45 and glass has a surface tension of 30 dynes/cm [0184]-[0186], [0194].

Regarding Claims 10-12 and 29-31, the composition can include a monomer curable by thermal or UV means and immediately exposed after deposition to polymerize and thicken and reduce spreading of the composition [0160], [0239].

Regarding Claims 13-15 and 32-34, the micron-sized particles have media particle size of at least 0.1 μm but preferably not greater than 20 μm [0032].

Regarding Claims 17 and 36, the conductive features have average width not greater than 250 μm [0279] (encompassing the claimed range of 100 μm - 165 μm).

Regarding Claims 18 and 37, the conductive feature can have an average thickness of greater than 0.01 μm, even greater than 1 μm [0276] (encompassing the claimed range of 1.8 μm - 2.0 μm).

Regarding Claims 19 and 38, the resistivity of the conductive features is not greater than 20 times the resistivity of the bulk conductor [0021].

Regarding Claim 26, the substrate can be glass or ceramic [0156].

Regarding Claim 39, Bishop teaches that the amount of resin in the ink jet printable composition is usually 5-45%. Providing polyvinyl pyrrolidone in the composition in amount of 5-45%, encompassed in the claimed range of 2 wt% or greater, would have been obvious to one of ordinary skill in the art, as taught by Bishop, as the usual amount of resin in the composition.

Response to Arguments

(10)

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection, applied because of the amendments to the claims. As clearly taught by the references cited, the use of spherical particles, either uncoated or coated with fatty acid, as the functional material and the use of polyvinyl pyrrolidone as the dispersant resin in an ink jet printable composition are both known in the art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melvin C. Mayes whose telephone number is 571-272-1234. The examiner can normally be reached on Mon-Fri 7:30 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Phillip C. Tucker can be reached on 571-272-1095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Melvin C. Mayes
Primary Examiner
Art Unit 1791

MCM
February 26, 2008

/Melvin C. Mayes/
Primary Examiner, Art Unit 1791